THERMO-MAGNETIC MACHINES.

IT would seem that at the present time there is being developed in the United States a new kind of engine, capable, at least in theory, of turning, by a magnetic method, the latent energy contained in fuel either into mechanical work or into the energy of electric currents. In this kind of machine the variations produced in the magnetic power of metals, such as iron and nickel, by heating and cooling them, are made the means of generating in the one case electric currents, in the other mechanical motion. The latter application was the earliest to be suggested. In the columns of NATURE (vol. xix. p. 397) will be found a note, extracted from the Journal of the Franklin Institute, upon a thermo-magnetic motor devised by Prof. E. J. Houston and Prof. E. Thomson, of Philadelphia. In this curious apparatus a disk or ring of thin steel is mounted on a vertical axis so as to be quite free to move, with its edges opposite the poles of a horse-shoe magnet. This wheel becomes of course magnetized by induction. When, however, heat is applied at a point on the circumference, the change thereby produced in the magnetic susceptibility of that part causes the disk to move round so as always to bring into line with the poles those portions of the disk which are for the time being the most susceptible to magnetization. Hence if the heating is continuous there will be a continuous rotation; the parts of the disk cooling as they leave the source of heat, and again becoming heated as they pass through the place where heat is being applied. The very same kind of thermo-magnetic motor was re-invented, in 1886, by Prof. Schwedoff, of Odessa, who, in a paper in the *Journal de Physique*, pointed out that this was a genuine case of conversion of heat into work, and gave the theory of the transformation and the cycle of operations from the thermo-dynamic point of view.

The next stage of invention in point of time, though it has only just been made public, is the suggestion by Mr. E. Berliner, of Washington, to use these thermo-magnetic variations in iron for the purpose of generating electric currents. In June 1885 Mr. Berliner filed an application for a patent for an "electric furnace generator," of which the following are the underlying principles:—"If," he says, "I take a magnet and provide it with a coil around its pole or poles, and place before this magnet and in proximity to the coil a piece of iron heated to bright red, nothing will occur to disturb the magnetic field; but the instant the iron cools down to a dull red, the magnetism becomes excited, and a momentary current of electricity is produced in the coil. I may go a step further and have a series of such magnet coils and iron armatures, and by connecting the coils into the same circuit, and cooling the armatures in rotation one after the other, a number of electrical impulses will be produced, which, when they follow one another rapidly, will approximate to a continuous electric current. . . . The current thereby produced might be utilized to charge another coil surrounding the magnet and reinforce the field; and in that case the magnet might be substituted by a tubular core of iron, . . . or a series of coils and magnets might be placed toward one larger armature disk, forming a common armature, heated by one furnace."

The most recent suggestions in this line come from Mr. T. A. Edison, who, independently of Mr. Berliner, has devised an almost identical generator, to which he has given the name of a "pyro-magnetic dynamo." At the recent meeting of the American Association of Science, a paper by Mr. Edison, giving an account of his machines, was read, and has been largely noticed in the non-technical press, as though it were an absolutely new departure in electric science. The famous inventor may certainly lay claim to having worked out in greater detail the practical problems of construction. In the generator there are eight double-pole electro-magnets arranged radially. At the top the eight poles converge toward a central space; and about a foot below the other eight poles converge toward a second central space. In these central spaces lie two soft iron disks, forming the cheeks of the armature, and pierced with eight large holes, each to receive eight vertical armature cores, each of which consists of a roll of corrugated sheet-iron surrounded with a coil of wire insulated with asbestos. The eight wire coils are connected up together and joined to a commutator, just like the coils in the armature of Niaudet's dynamo. This armature stands over a furnace, the heated gases of which are led up through the interstices of the eight rolls of sheet-iron. By the use, however, of a revolving screen of fire-clay the ascending hot gases are cut off successively from some of these tubular cores so that they are alternately heated and cooled, giving rise to electric currents in the coils, which currents are collected above by the action of the commutator. The arrangement appears to have been constructed with Mr. Edison's well-known ingenuity. The inventor has also constructed a pyro-magnetic motor, which consists essentially of a powerful field-magnet (independently excited) having between its poles as a rotating armature a bundle of small vertical tubes of very thin iron, which are packed in a convenient drum-like form and mounted on a vertical spindle. From a furnace underneath rise currents of heated air, and pass through the iron tubes; but, by a screen placed in a suitable position below, the heated air is prevented from rising through some of the tubes, and instead thereof a blast of cool air is blown down these: the cooled tubes, becoming more highly magnetic, are more powerfully attracted by the poles of the field-magnet, and move forward, only to be afresh heated, whilst a new set of tubes comes into position to be cooled and attracted. Mr. Edison states that already a speed of 120 revolutions per minute is practicable; and he is building one of these motors calculated to work at 3 horse-power. Whether the sanguine hopes which he expresses as to the economic working of such motors and generators, as compared with existing engines and dynamos, will be fulfilled in the future is as yet a matter of speculation. But the practical problem, even though it is surrounded by many obvious difficulties, is of so tempting a nature, and the attempt to solve it is so daring, that we must wish to our Transatlantic friends the utmost success in their efforts to supersede the present wasteful methods of utilizing the latent energy of fuel.

NOTES.

THE following is the list of names recommended by the President and Council of the Royal Society for election into the Council for the year 1888, at the forthcoming anniversary meeting on the 30th inst.:—President: Prof. George Gabriel Stokes. Treasurer: Dr. John Evans. Secretaries: Prof. Michael Foster, the Lord Rayleigh. Foreign Secretary: Prof. Alexander William Williamson. Other members of the Council: Sir William Bowman, Bart., Henry Bowman Brady, Prof. Arthur Cayley, W. T. Thiselton Dyer, Prof. David Ferrier, Dr. Edward Frankland, Dr. Arthur Gamgee, Prof. Joseph Henry Gilbert, Prof. John W. Judd, Prof. Herbert McLeod, Dr. William Pole, William Henry Preece, Admiral Sir George Henry Richards, K.C.B., Prof. Arthur William Rücker, the Earl of Rosse, and Sir Bernhard Samuelson, Bart.

MR. F. J. JACKSON has presented to the Natural History Museum an interesting set of animals collected by him during his three years' residence in East Africa. The birds are particularly valuable, and contain many species new to the Museum collection. Mr. Jackson resided for some time in the Kilima N'jaro district, and procured several rare species hitherto only known from the late Dr. Fischer's collections in the Berlin

Museum. From Lamu and Manda Island the additions to the Museum collection are numerous, and supply many desiderata to the series of bird-skins.

THE remains of the great naturalist, Audubon, lie in an obscure and little-visited portion of Trinity Cemetery, New York City, and his tomb is not marked by any distinguishing monument. A movement has been started for the erection of a suitable monument. At the first autumn meeting of the New York Academy of Sciences a Committee was appointed to collect funds and make all necessary arrangements. This Committee, of which Dr. Britten is Secretary and Treasurer, is now ready to receive subscriptions, which will be properly acknowledged. It is estimated that from 6000 to 10,000 dollars will be required. While confident that this amount might be collected in America, the Committee are anxious that interest should be taken in the project by men of science in all departments in all parts of the world.

MR. EDWIN LEES, who died lately at Worcester at the age of eighty-seven, had a considerable reputation as a naturalist. Among his writings are "The Botany of the Malvern Hills," "Pictures of Nature among the Malvern Hills and Vale of Severn," "The Botany of Worcestershire," and "The Forest and Chace of Malvern." He was one of the founders of the Worcestershire Natural History Society, and of the Worcestershire Naturalists' Field Club.

MR. THOMAS BOLTON, of the Microscopists' and Naturalists' Studio, Birmingham, died on Monday. He was in his fifty-seventh year. About a year ago a Civil List pension of £50 per annum was granted to Mr. Bolton in recognition of his services as a naturalist and microscopist. The memorial setting forth his claims, discoveries, and special circumstances was signed by Sir J. W. Dawson and many other eminent men of science.

A CONFERENCE on Technical Education, in which working men took a prominent part, was held last Saturday evening at the Finsbury Technical College. There was a large attendance of students and others. Mr. James Rowlands, M.P., occupied the chair, and Prof. Silvanus P. Thompson read an address on "The Present Position of the Technical Instruction Question." Prof. Thompson urged that the most essential of all the conditions for the organization of an adequate system of technical instruction is the creation of "a real Education Department under a real Minister of Education."

AT the annual meeting of the delegates of the Union of Lancashire and Cheshire Institutes at Crewe on Monday, Lord Derby delivered an excellent address on education. In the course of his remarks he pointed out that the "Institutes of fifty years ago for the most part failed because of the want of good primary schools to feed them. "You have the schools now," he continued, "and what we have to do is to provide the means of carrying on the instruction of those who are willing to learn after the time when they are clear of school, and free to follow their own devices when the day's work is over." Speaking of technical instruction, Lord Derby said :—"We are fighting for the markets of the world ; we have held our own hitherto, but the struggle is sharper than ever, and we cannot afford to throw away any advantage which is possessed by other countries. It may be that, as often happens, we shall find out that we have overrated the benefit of technical teaching, that it can do less for us than we now expect ; but we are not the less bound to try, and to deserve success, whether we get it or not."

SOME electric balloon signalling experiments were carried on at Berchem, in the fortifications outside Antwerp on Wednesday evening, October 26. The system used was known as the Bruce system, and the inventor, Mr. Eric Stuart Bruce, himself superintended the experiments at the invitation of the Belgian War Minister. The balloon used, which had just been purchased of Mr. Bruce by the Belgian Government, was a small one, being only 15 feet in diameter. It had been designed for hydrogen, but though it was filled with very dense coal-gas it lifted 500 feet of electric cable besides its captive rope. This special cable was an improvement on what was formerly used by Mr. Bruce, being now lighter though of the same current capacity. The Bruce key also, which gave great satisfaction, has been lately considerably modified, and can carry any current, the contacts being of carbon, which can easily be renewed on wearing away. The Minister of War, General Pontus, General Wauwermans, Inspector-General of Fortifications at Antwerp, and various other distinguished officers were present, including special delegates from Russia, Holland, &c., &c. The first telegram sent was : "Porte d'Herenthals de Berchem. Voyez vous distinctement signaux Bruce, répétez la dépêche par téléphone. (Signé) Général Wauwermans." This was distinctly read and telephoned back. Also the second, sent by the Minister of War : "Envoyez un bataillon au fort 1. (Signé) Ministre Guerre Pontus." A third telegram sent to the Caserne of Telegraphists was equally successful. There were six lights in the balloon giving about twenty candle-power each. The telephonic stations of Rehls were comparatively near, being only at a distance of from 4 to 5 kilometres ; the object that night being to test at once the distinctness of the signals, by placing the observing-stations on the existing telephonic circuits ; but the night was an ideal one for signalling, and it is understood that the balloon was seen to an enormous distance. A company was also on the look-out at the top of the tower of Notre Dame, at Antwerp (4 kilometres), and they distinctly read all the messages sent.

CONSIDERABLE uncertainty has, up to the present time, existed as to the number and composition of the compounds of gold with sulphur. For years it was supposed that there were three sulphides of gold—Au_2S, Au_2S_2, and Au_2S_3 ; but Schrötter and Pruvoznik, in 1874, came to the conclusion that no sulphides of gold were to be obtained in a pure state, thus leaving the subject in greater darkness than ever. Happily, however, this deplorable uncertainty has at length been completely dispelled by Drs. Hoffmann and Krüss, of Munich, who have abandoned the methods of Berzelius, Levol, and Schrötter and Pruvoznik, for more fruitful ones of their own. The lowest sulphide of gold, Au_2S, was obtained by the addition of hydrochloric acid to a solution of the double cyanide of gold and potassium saturated with sulphuretted hydrogen. The last traces of admixed sulphur were removed by washing with sulphuretted hydrogen solution, alcohol, ether, carbon disulphide, and finally again with ether. After drying over phosphoric oxide, pure Au_2S was obtained as a dark-brown powder, yielding theoretical numbers on analysis. When freshly precipitated it is remarkably soluble in water, indicating a close relationship to the metals of the alkalies, whose sulphides are also soluble in water, and thus asserting its position in the first vertical series of the periodic system. With polysulphides of the alkalies it forms green sulpho-salts. It decomposes at 240°, leaving a residue of pure gold, and, if warmed in a stream of oxygen, takes fire, forming SO_2, and again leaving its gold in the metallic state. In a second communication in the current number of the *Berichte*, Hoffmann and Krüss describe how they have succeeded in preparing Au_2S_2. A cold neutral solution of gold chloride was precipitated by sulphuretted hydrogen until the supernatant liquid became colourless. Admixed sulphur was removed from the precipitate in a manner similar to that employed in case of Au_2S, and finally pure Au_2S_2 isolated as a deep black substance, decomposed by heat similarly to Au_2S. It is distinguished from the latter sulphide by being decomposed by caustic potash with formation of potassium oxy- and sulpho-salts and separation of a little metallic gold. Au_2S_3 of Berzelius was found not to exist, being merely a mixture of Au_2S_2 and sulphur, for the former substance was completely extracted by a solution of potassium cyanide, leaving an emulsion of finely-divided sulphur.

The November Bulletin of Miscellaneous Information, issued from the Royal Gardens, Kew, is the first of a series of papers in which information will be given as to the capabilities of our colonies to grow and export fruit. The authorities of Kew have little doubt that, if proper arrangements were made for packing and shipping, large quantities of fruit might be exported from Cape Colony, Natal, the Australian colonies, and New Zealand. It is thought that much of this, arriving in England during the winter and early spring months, would be readily bought to supply the wants of the community, and that the prices paid for such fruit as an article of luxury would be sufficiently high to cover the cost of bringing it from the southern hemisphere. Much interest was taken in the fruit shown from all parts of the Empire at the late Colonial and Indian Exhibition. An effort, therefore, has been made at Kew to collect information on the subject, and excellent service, no doubt, will be done by the publication of the facts which have been brought together. In the present Bulletin a full account is given of Canadian fruits.

The fifth part (just issued) of the Transactions of the Leicester Literary and Philosophical Society contains an interesting paper, by Mr. F. T. Mott, on foreign fruits available for acclimatization in England. Among the plants to which he calls attention is the *Zizyphus vulgaris*, which produces a yellow fruit of pleasant flavour, the size of a small gooseberry. These fruits are usually dried and sold under the name of jujubes, the gelatine jujubes of our shops being named after them. "It is probable," says Mr. Mott, "that no species of *Zizyphus* in its present condition would ripen its fruit in English gardens, but the art of cultivation consists in so modifying the natural habits of plants as to adapt them to man's needs in various climates. This is accomplished by selection, propagation by seed, changes of soil, and gradual exposure. The first step would probably be to obtain a hardy variety of the *Zizyphus vulgaris* regardless of the quality of the fruit. A tree should be selected in the most elevated and exposed situation in which it naturally ripens its fruit. Seeds from this tree should be grown in a slightly colder climate, and if any of them can be got to ripen fruit, the seeds of these should be again reared still further north. In this manner the tree might gradually be acclimatized in our southern counties. Having once obtained a sufficiently hardy stock, the next process would be to improve the fruit. This would be done by selection of seed with reference to the fruit rather than to the hardiness of the plant, by crossing with Indian or Chinese species, and by careful study of soil and general treatment. The process of thus producing a new hardy fruit would be tedious, because fruiting trees can scarcely be brought to such a state of maturity as to show their true characters in less than eight or ten years from the sowing of the seed, and five or six generations at least might be required to produce any useful result. But the experiment would be interesting in all its stages, and the object if ultimately attained would be of great value."

We have received the General Report on the operations of the Survey of India Department, administered under the Government of India, during 1885–86. The Report has been prepared under the direction of Colonel H. R. Thuillier, R.E., officiating Surveyor-General of India. It is divided into three parts. Part I. is introductory; Part II. contains a summary of the operations of the trigonometrical, topographical, and revenue survey parties; in Part III. there is an account of the operations of the several head-quarter offices. Extracts from narrative reports are presented in an appendix. Among the "general remarks" in Part I. there is a paragraph in which some dissatisfaction is expressed with existing arrangements. "The large demands," says the writer, "that have been made on the Survey Department for officers required to accompany political missions and military expeditions, and for other special work, combined with the circumstance of a larger percentage than usual being absent on medical leave, has rendered the efficient prosecution of the regular work of the Department peculiarly difficult. This has been the subject of remark in the Annual Reports for the past two years, and during the year under review the paucity of officers has been still more seriously felt. There has been absolutely no reserve of trained officers, and the administration of the Department has consequently been a task of considerable anxiety. It is necessary to record that the working machinery of the Department has been limited to a dangerous extent."

It is stated that the Government of the Straits Settlements are about to undertake a systematic survey, on the Indian plan, of their territory and of that of the neighbouring "protected" States. Colonel Burrow, of the Indian Survey Department, was recently appointed to advise the Colonial Government on the subject, with the result here stated.

The Asiatic Society of Japan has, we are glad to observe, published a General Index to its Transactions. There are now thirty-six parts, or fifteen volumes, of the latter, and as almost every foreign scholar in Japan has been a contributor to the Society's Proceedings for fourteen or fifteen years past, it was necessary that an index should be published. About two years ago we noticed the publication of an index to the Proceedings of the Society's friendly rival, the German Society.

Mr. Henry Seebohm is about to issue a work on the Geographical Distribution of the *Charadriidæ* (Plovers, Sandpipers, and Snipes, &c.). The unrivalled collection of Wading Birds in Mr. Seebohm's possession supplies the material for this work, and the volume will undoubtedly be one of great interest to ornithologists. Mr. Seebohm's ideas on nomenclature, the influence of the Glacial epoch on the migration of birds, and other kindred subjects, are always original, and this new work of his will open, according to the prospectus, with an introduction setting forth his latest opinions. There is also to be given "a complete synonymy from 1776 to the present time," a rather appalling announcement, and one involving a vast change in ornithological nomenclature, as it will preclude the use of Linnean names.

A translation, by Miss Margaret K. Smith, of Seidel's "Industrial Instruction" is about to be issued in America by Messrs. D. C. Heath and Co. The author presents an exposition of "the principles underlying the claims of hand labour to a place on the school programme."

"The Shell-Collector's Hand-book for the Field," by Dr. J. W. Williams, the editor of *The Naturalist's Monthly*, will be published immediately by Messrs. Roper and Drowley. It will give full directions as to the collecting and preserving of British land and fresh-water shells, and will describe the habitat of each. Every genus, species, and variety known to the Conchological Society up to date of publication will be noted.

Mr. T. A. Walker's "History of the Making of the Severn Tunnel" is, we understand, likely to appear about Christmas. In addition to portraits on steel of some of the more prominent engineers concerned in the enterprise, there will be numerous plans and sections showing the gradual progress of the work, and diagrams of the large pumping-engines, &c. Messrs. Bentley and Son will be the publishers.

Sir James Paget's address to the medical students at Owens College, delivered at the opening of the session 1887–88, has been published. The subject is, the utility of scientific work in the practice of medicine and surgery.

THE new number of the Journal of the Anthropological Institute contains a striking paper by Dr. George Harley, in which he attempts to show that the tendency of civilization is decidedly to lower the bodily recuperative powers of human beings. Another interesting paper—by Mr. G. L. Gomme—is on the evidence for Mr. McLennan's theory of the primitive human horde.

MESSRS. S. WIGG AND SON, Adelaide, are issuing a work on "Common Native Insects of South Australia," by Mr. J. G. O. Tepper. It is intended to serve as a popular guide to South Australian entomology. Part I. relates to Coleoptera.

A PAPER containing a list of the mammals of Manitoba, by Mr. Ernest E. Thompson, has been reprinted from the Transactions of the Manitoba Scientific and Historical Society. It consists chiefly of the author's field notes.

A CORRESPONDENT writes from St. Petersburg that tigers have been encountered this autumn in parts of Asiatic and European Russia where they have never been found before. Some time ago one of these beasts was captured near Wladiwostock, in Siberia, and another in the government of the Caucasus, close to the Black Sea. Both animals have been conveyed to St. Petersburg alive.

A NORWEGIAN astronomer has collected seventeen reports from various parts of Norway respecting the great meteor seen in that country on the evening of September 18, no doubt the largest meteor seen in Norway in recent times. These reports show that the meteor was seen as far north as Hamar, in Central Norway, and as far south as the towns of Fredrikshald and Skien, on opposite sides of the Christiania Fjord, the capital and neighbourhood appearing to be in the centre of its track. Its light was everywhere magnificent, having the appearance of a sudden blaze of electric light. The reports from Drammen and neighbourhood, as well as those from the province of Smaalenene, on the opposite side of the Christiania Fjord, maintain that the bursting of the meteor, which took place within this area, was accompanied by a loud report; but the astronomer in question is of opinion that this belief is due to some freak of the imagination, as the track of the meteor, covering such a vast area of land, must have lain too high in the atmosphere for any sound to be heard. He calculates from the reports to hand that the bursting of the meteor occurred at an altitude of about 6000 feet, and he thinks that even this figure may be safely doubled, as no doubt the meteor was seen far north and south of the places whence reports have been received.

THE Aino idea of an eclipse is described by the well-known student of Aino language and manners, Mr. Bachelor, in a recent number of the *Japan Weekly Mail*. Mr. Bachelor specially observed the conduct of the Ainos during the recent eclipse. The Aino, he says, is a very matter-of-fact person, and is not usually carried away by the imagination. On being shown the eclipse through a smoked glass, the Aino cried out that the sun was fainting away and dying. A silence then ensued, and from time to time an exclamation of surprise or fear was to be heard; it was evident the fear was that the sun would die away and never revive. They brought water and sprinkled it upwards towards the sun (as they would do if a human being were expiring), crying at the same time, "O god, we revive thee! O god, we revive thee!" Some squirted the water upwards with their mouths, others threw it with their hands, others, again, used the common besom or willow-branches, the latter being supposed to be specially efficacious. A few, especially women and girls, sat down with their heads hidden between their knees, as if silently expecting some dreadful calamity to suddenly befall them. They have no theories with regard to eclipses, but their traditions run like this:—"When my father was a child, he heard his old grandfather say that his grandfather saw a total eclipse of the sun. The earth became quite dark, and shadows could not be seen; the birds went to roost, and the dogs began to howl. The black, dead sun shot out tongues of fire and lightning from its sides, and the stars shone brightly. Then the sun began to return to life, and the faces of the people wore an aspect of death; and, as the sun gradually came to life, then men began to live again."

THE first meeting of the one hundred and thirty fourth session of the Society of Arts will be held on Wednesday, November 16, when the opening address will be delivered by Sir Douglas Galton, Chairman of the Council. Previous to Christmas there will be four ordinary meetings, in addition to the opening meeting. For these meetings the following arrangements have been made:—November 23, Prof. Silvanus P. Thompson, "The Mercurial Air-pump;" November 30, Mr. J. B. Hannay, "Economical Illumination from Waste Oils;" December 7, Mr. P. L. Simmonds, "The Chemistry, Commerce, and Uses of Eggs of Various Kinds;" December 14, Sir Philip Magnus, "Commercial Education." During the session there will be six courses of Cantor Lectures—"The Elements of Architectural Design," by Mr. H. H. Statham; "Yeast, its Morphology and Culture," by Mr. A. Gordon Salamon; "The Modern Microscope" (being a continuation of the recent course of Cantor Lectures on the "Microscope"), by Mr. John Mayall, Jun.; "Alloys," by Prof. W. Chandler Roberts-Austen, F.R.S.; "Milk Supply and Butter and Cheese Making," by Mr. Richard Bannister; "The Decoration and Illustration of Books," by Mr. Walter Crane. Two juvenile lectures on "The Application of Electricity to Lighting and Working," by Mr. William Henry Preece, F.R.S., will be given during the Christmas holidays.

THE additions to the Zoological Society's Gardens during the past week include a Campbell's Monkey (*Cercopithecus campbelli*) from West Africa, presented by Mr. E. B. Mitford; a Weeper Capuchin (*Cebus capucinus*) from Brazil, presented by Mr. C. N. Skeffington; a Raccoon-like Dog (*Canis procynides*) from China, presented by Mr. W. T. Manger; an Indian Antelope (*Antilope cervicapra*) from India, presented by Mrs. M. V. Charrington; a Leopard (*Felis pardus*) from Ceylon, presented by the Dissawe of Tamankadua Dulewa Adijur; a Common Squirrel (*Sciurus vulgaris*), British, presented by Mr. A. Townsend; a Naked-footed Owlet (*Athene noctua*), European, presented by Mr. R. E. Holding; a Laughing Kingfisher (*Dacelo gigantea*) from Australia, presented by Mr. G. E. Frodsham; two Larger Hill-Mynahs (*Gracula intermedia*) from Northern India, presented respectively by Mr. J. M. Cook and Mrs. J. S. Beale; a Gray-headed Porphyrio (*Porphyrio poliocephalus*) from India, presented by Lady Morshed; a West African Python (*Python sebæ*) from West Africa, a Common Boa (*Boa constrictor*) from South America, two Testaceous Snakes (*Ptyas testacea*), an Alleghany Snake (*Coluber alleghaniensis*) from North America, deposited; six Mocassin Snakes (*Tripidonotus fasciatus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN

THE VARIABLE STAR U OPHIUCHI.—Mr. S. C. Chandler, Jun., who first determined the true period of this star, of all variables the one with shortest period and most rapid fluctuations of light, has brought together, in No. 161 of *Gould's Astronomical Journal*, all the observations of magnitude of this star available. Of these, one made by Schjellerup on June 7, 1863, is of special value, as it was evidently made near the time of minimum, and at an interval of nearly 8000 periods from the principal epoch; whilst a series made at Cordoba in 1871 and 1872 has proved of very high importance. The discussion of these various observations show that it is exceedingly probable that the period has undergone a slight shortening; all the data being well reconciled by the assumption that each period is